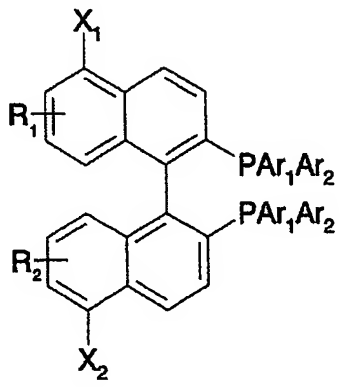
AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1-64 (Canceled)

65. (Previously presented) A diphosphine in racemic form or in chiral form, corresponding to formula (I):



(I)

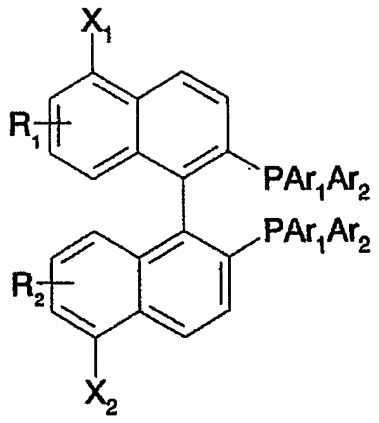
in said formula:

- R_1 and R_2, which are identical or different, represent a hydrogen atom or a substituent,
- Ar_1 and Ar_2 independently represent an alkyl, alkenyl, cycloalkyl, aryl or arylalkyl group,
- X_1 and X_2, which are identical or different, represent:
  - a group R, alkyl, alkenyl, alkynyl, cycloalkyl, aryl or arylalkyl,
  - an alkyl group substituted with one or more halogen atoms, preferably fluorine, or with nitro or amino groups,
  - a halogen atom chosen from bromine, chlorine and iodine,
  - an -OH group,
  - a group -O-COR_a,
  - a group -O-R_a,
  - a group -S-R_a,

- a -CN group,
- a group derived from the nitrile group such as:
  - a $-CH_2-NH_2$ group,
  - a -COOH group,
- a group derived from the carboxylic group such as:
  - a group $-COOR_a$,
  - a $-CH_2OH$ group,
  - a group $-CO-NH-R_b$,
- a group derived from the aminomethyl group such as:
  - a group $-CH_2-NH-CO-R_b$,
  - a group $-CH_2-NH-CO-NH-R_b$,
  - a group $-CH_2-N=CH-R_a$,
  - a $-CH_2-N=C=O$ group,
  - a $-CH_2-NH_4^+$ group,
- a group comprising a nitrogen atom such as:
  - a group $-NHR_a$,
  - a group $-N(R_a)_2$,
  - a group $-N=CH-R_a$,
  - an $-NH-NH_2$ group,
  - an $-N=N^+=N^-$ group,
  - an -N=C=O group, or
- a magnesium or lithium atom,

in the various formulae, R_a represents an alkyl, cycloalkyl, arylalkyl or phenyl group and R_b has the meaning given for R_a and also represents a naphthyl group.

66. (Previously presented) The diphosphine as claimed in claim 65, bearing two functional groups capable of reacting with one or more polymerizable monomers corresponding to the general formula (I'):



(I')

in said formula:

- R_1 and R_2, which are identical or different, represent a hydrogen atom or a substituent,
- Ar_1 and Ar_2 independently represent an alkyl, alkenyl, cycloalkyl, aryl or arylalkyl group,
- X_1 and X_2, which are identical, represent:
  - an -OH group,
  - a $-CH_2OH$ group,
  - a $-CH_2-NH_2$,
  - a -COOH group,
  - a group $-COOR_a$ in which R_a represents an alkyl, cycloalkyl, arylalkyl or phenyl group,
  - an -N=C=O group, or
  - a $-CH_2-N=C=O$ group.

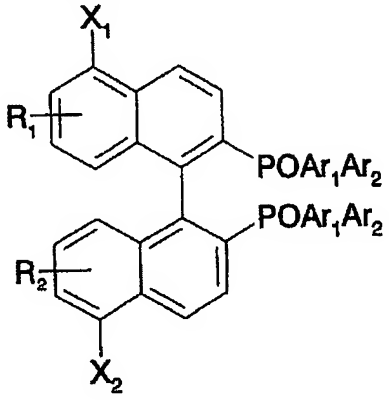
67. (Previously presented) The diphosphine as claimed in claim 65, wherein in formula (I) or (I') Ar_1 and Ar_2 represent a (C_1-C_6)alkyl group, a phenyl group optionally substituted with one or more (C_1-C_6)alkyl or (C_1-C_6)alkoxy; or a (C_4-C_8)cycloalkyl group optionally substituted with one or more (C_1-C_6)alkyl groups.

68. (Previously presented) The diphosphine as claimed in claim 65, wherein in formula (I) or (I') R_1 and R_2, which are identical or different, represent a hydrogen atom or an alkyl or alkoxy group containing from 1 to 4 carbon atoms,Ar_1 and Ar_2 represent a phenyl group and R_1 and R_2 represent a hydrogen atom, and X_1 and X_2, which are identical, represent:

  - a halogen atom, preferably a bromine or chlorine atom,

- an alkyl group substituted with one or more fluorine atoms,
- a -CN group,
- a $-CH_2-NH_2$ group, or
- a -COOH group.

69: (Previously presented) A diphosphine in dioxide form, in racemic form or in chiral form corresponding to formula (II):



(II)

in which in said formula:

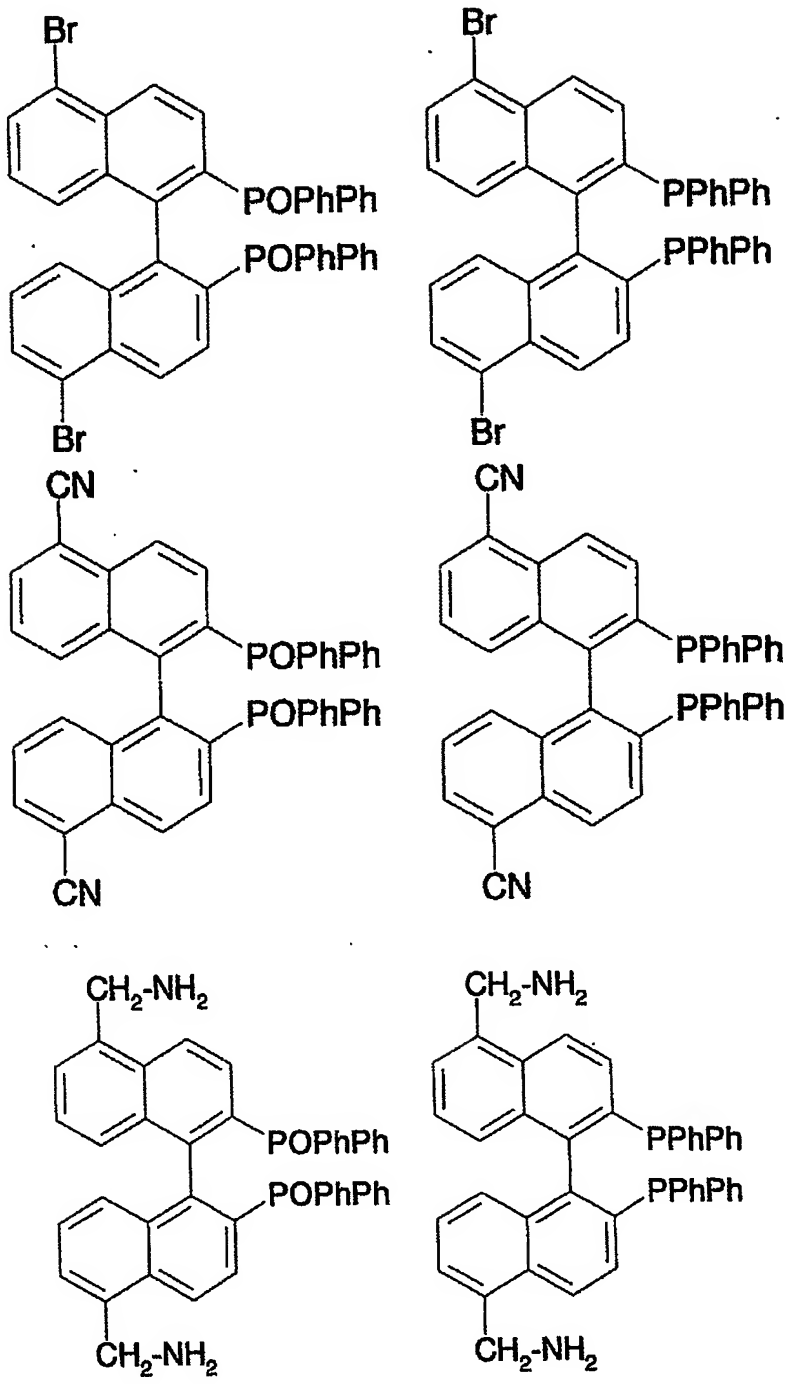
- R_1 and R_2, which are identical or different, represent a hydrogen atom or a substituent,
- Ar_1 and Ar_2 independently represent an alkyl, alkenyl, cycloalkyl, aryl or arylalkyl group,
- X_1 and X_2, which are identical or different, represent:
  - a group R, alkyl, alkenyl, alkynyl, cycloalkyl, aryl or arylalkyl,
  - an alkyl group substituted with one or more halogen atoms, preferably fluorine, or with nitro or amino groups,
  - a halogen atom chosen from bromine, chlorine and iodine,
  - an -OH group,
  - a group $-O-COR_a$,
  - a group $-O-R_a$,
  - a group $-S-R_a$,
  - a -CN group,
  - a group derived from the nitrile group such as:
    - a $-CH_2-NH_2$ group,
    - a -COOH group,
  - a group derived from the carboxylic group such as:

- a group $-COOR_a$,
- a $-CH_2OH$ group,
- a group $-CO-NH-R_b$,

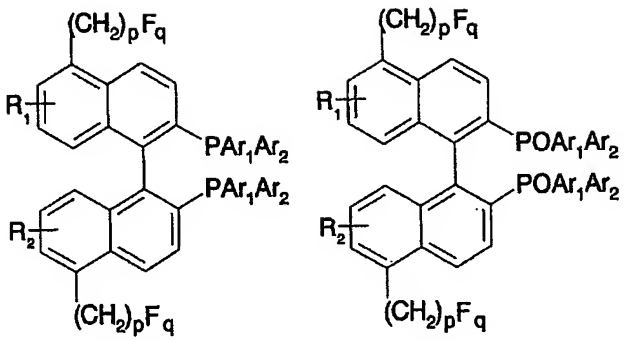
- a group derived from the aminomethyl group such as:
  - a group $-CH_2-NH-CO-R_b$,
  - a group $-CH_2-NH-CO-NH-R_b$,
  - a group $-CH_2-N=CH-R_a$,
  - a $-CH_2-N=C=O$ group,
  - a $-CH_2-NH_4^+$ group,
- a group comprising a nitrogen atom such as:
  - a group $-NHR_a$,
  - a group $-N(R_a)_2$,
  - a group $-N=CH-R_a$,
  - an $-NH-NH_2$ group,
  - an $-N=N^+=N^-$ group,
  - an $-N=C=O$ group, or
- a magnesium or lithium atom,

in the various formulae, R_a represents an alkyl, cycloalkyl, arylalkyl or phenyl group and R_b has the meaning given for R_a and also represents a naphthyl group.

70. (Previously presented) The diphosphine or diphosphine in dioxide form as claimed in claim 69, wherein it corresponds to one of the following formulae:

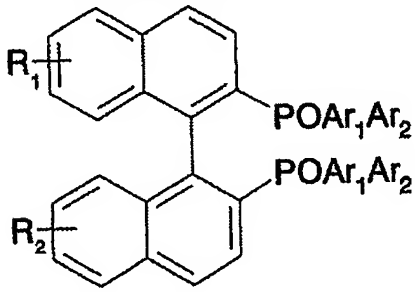


71. (Previously presented) The diphosphine or diphosphine in dioxide form as claimed in claim 65 having one of the following formulae:



in which p is between 1 and 15, optionally between 6 and 10, q is between 3 and 21 , optionally between 13 and 25.

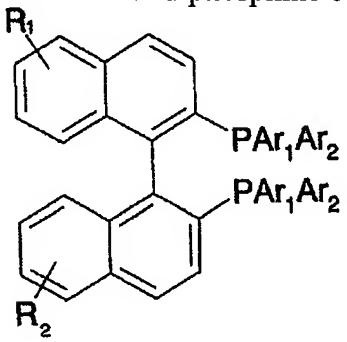
72. (Previously presented) A process for preparing a diphosphine or a diphosphine in dioxide form as defined in claim 65, comprising at least one step of halogenation in position 5,5' of a compound of formula (III):



(III)

in said formula R_1, R_2, Ar_1 and Ar_2 have the meaning given above, said halogenation being optionally performed in an inert aprotic solvent.

73. (Previously presented) The process as claimed in claim 72, wherein the diphosphine in dioxide form of formula (III) is obtained by oxidation of the chiral or achiral diphosphine of formula (IV):



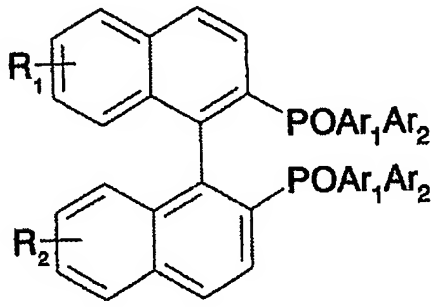
(IV)

in said formula:

- R_1, R_2, Ar_1 and Ar_2 having the meaning given above.

74. (Previously presented) A process for preparing the diphosphine corresponding to formula (I) or (I') as defined in claim 65, and wherein X_1 and X_2 represent a halogen atom, said process comprising the following steps:

i) performing an halogenation in the 5,5' position of a compound of formula (III):

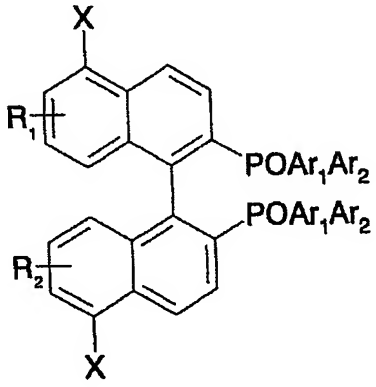


(III)

wherein:

- R_1, R_2, Ar_1 and Ar_2 have the meaning given above,

using a halogen and in the presence of iron, so as to obtain the corresponding dihalo compound of formula:

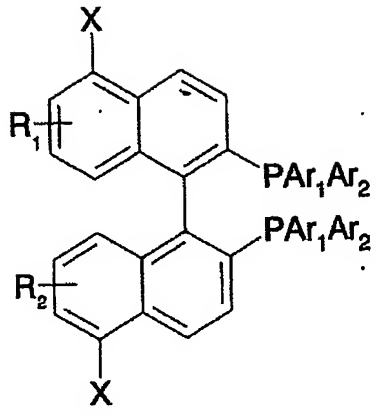


(IIa_1)

in said formula:

- X represents a chlorine, bromine or iodine atom,
- R_1, R_2, Ar_1 and Ar_2 have the meaning given above; and

ii) performing the reduction of the diphosphine in dioxide and dihalo form in position 5,5' of formula (IIa_1), into the diphosphine of formula (Ia_1):



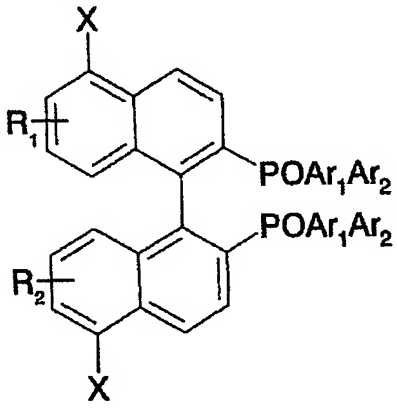
(Ia1)

in said formula:

- X represents a chlorine, bromine or iodine atom, and
- R_1, R_2, Ar_1 and Ar_2 having the meaning given above.

75. (Previously presented) A process for preparing the diphosphine corresponding to formula (I) or (I') as defined in claim 65 and wherein X_1 and X_2 represent a -CN group, comprising the following steps:

i) performing a cyanation by the substitution of the two halogen atoms, optionally in the presence of copper cyanide, with cyano groups by reacting the diphosphine in dioxide and dihalo form in position 5,5' of formula (IIa_1):

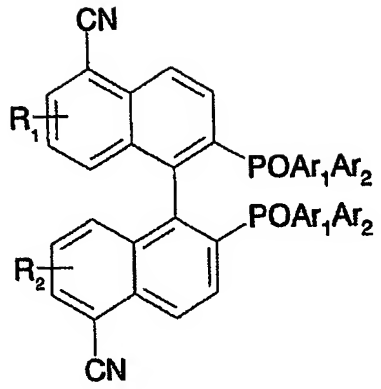


(IIa1)

in said formula:

- X represents a chlorine, bromine or iodine atom,
- R_1, R_2, Ar_1 and Ar_2 have the meaning given above,

using a suitable nucleophilic reagent so as to obtain the corresponding dicyano compound (IIa_2):

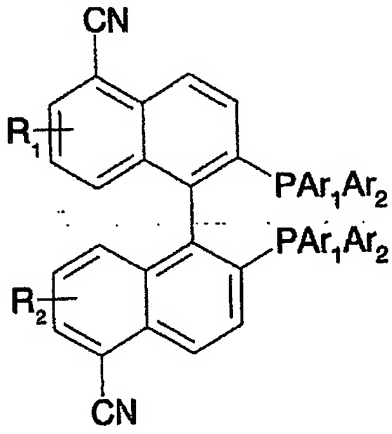


(IIa2)

in said formula:

- R_1, R_2, Ar_1 and Ar_2 have the meaning given above, and

ii) performing the reduction of the diphosphine in dioxide and dicyano form in position 5,5' of formula (IIa_2) into the diphosphine of formula (Ia_2):



(Ia2)

in said formula:

- R_1, R_2, Ar_1 and Ar_2 have the meaning given above.

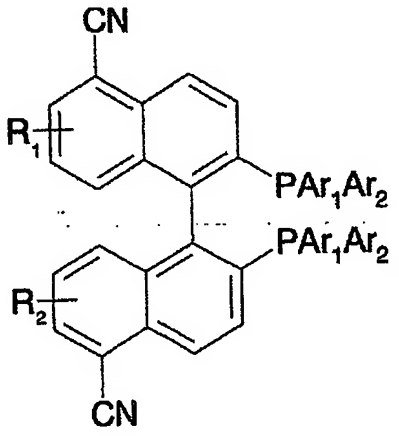
76. (Previously presented) The process as claimed claim 75, wherein the reduction of the diphosphine in dioxide form is performed using a hydrogenosilane of formula:

$$HSiR_\alpha R_\beta R_\delta \ (F_a)$$

in said formula:

- R_α, R_β and R_δ, which are identical or different, represent a hydrogen atom, an alkyl group containing from 1 to 6 carbon atoms, a phenyl group or a chlorine atom, and
- at most two of the groups R_α, R_β and R_δ represent a hydrogen atom, and optionally using a mixture of $PhSiH_3$ (or PMHS) and $HSiCl_3$.

77. (Previously presented) A process for preparing the diphosphine as defined in claim 65, wherein X_1 and X_2 represent a $-CH_2-NH_2$ group, said process comprising a step of reducing, optionally in the presence of lithium aluminum hydride ($LiAlH_4$), the cyano group of the compound of formula (Ia_2)

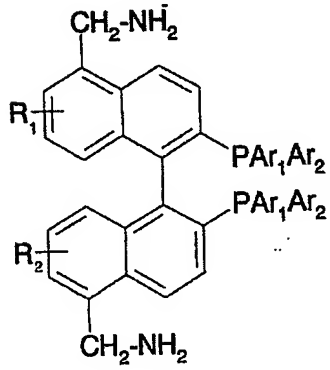


(Ia_2)

in said formula:

- R_1, R_2, Ar_1 and Ar_2 have the meaning given above,

leading to the corresponding diaminomethyl compound of formula (Ia_3):

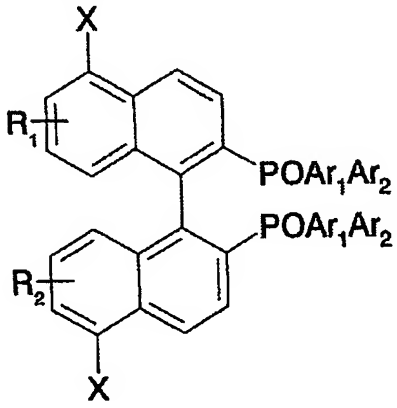


(Ia_3)

in said formula:

- R_1, R_2, Ar_1 and Ar_2 have the meaning given above.

78. (Previously presented) The process for preparing the diphosphine as defined in claim 65, wherein X_1 and X_2 represent a -COOH groupcomprising the steps of:
i) performing a cyanation by the substitution of the two halogen atoms, optionally in the presence of copper cyanide, with cyano groups by reacting the diphosphine in dioxide and dihalo form in position 5,5' of formula (IIa_1):

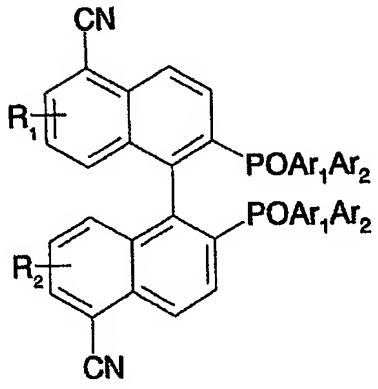


(IIa_1)

in said formula:

- X represents a chlorine, bromine or iodine atom,
- R_1, R_2, Ar_1 and Ar_2 have the meaning given above,

using a suitable nucleophilic reagent so as to obtain the corresponding dicyano compound (IIa_2):

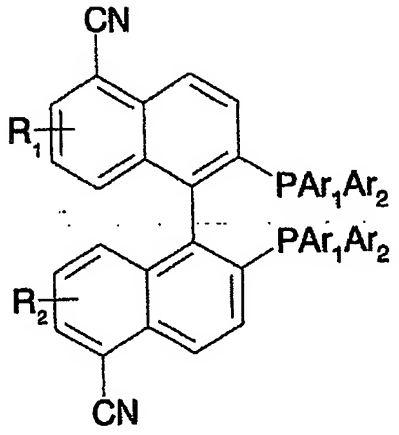


(IIa_2)

in said formula:

- R_1, R_2, Ar_1 and Ar_2 have the meaning given above, and

ii) performing the reduction of the diphosphine in dioxide and dicyano form in position 5,5' of formula (IIa_2) into the diphosphine of formula (Ia_2):

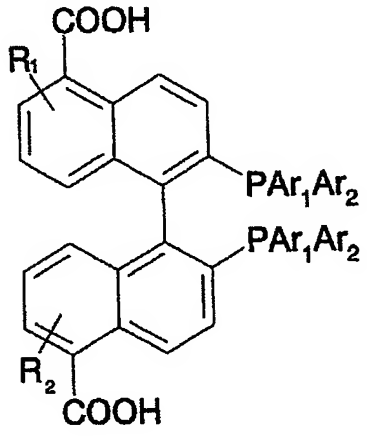


(Ia_2)

in said formula:

- R_1, R_2, Ar_1 and Ar_2 have the meaning given above; and, then,

iii) treating, in acidic medium or in basic medium, the compound of formula (Ia_2), so as to obtain the corresponding carboxylic acid of formula (Ia_4):

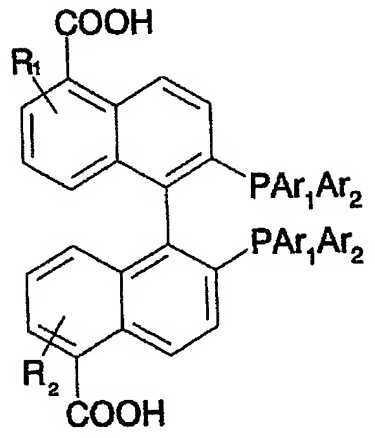


(Ia_4)

in said formula:

- R_1, R_2, Ar_1 and Ar_2 have the meaning given above.

79. (Previously presented) The process for preparing the diphosphine as defined in claim 65, wherein X_1 and X_2 represent a group $-COOR_a$ in which R_a represents an alkyl, cycloalkyl, arylalkyl or phenyl group, comprising the step of performing the direct esterification of a compound of formula (Ia_4):



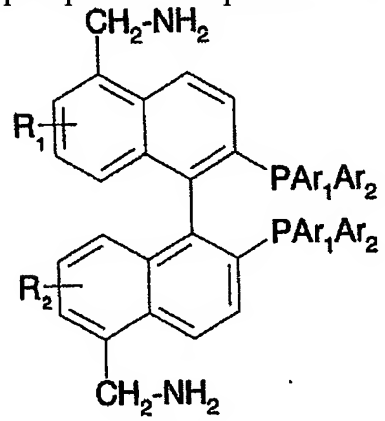
(Ia4)

in said formula:

- R_1, R_2, Ar_1 and Ar_2 have the meaning given above.

80. (Previously presented) A polymer in racemic or optically active form, made by reaction of a chiral or achiral diphosphine of formula (I') as defined in claim 66, with one or more polymerizable monomers.

81. (Previously presented) The polymer as claimed in claim 80, wherein the diphosphine corresponds to formula (Ia_3) as follows:



(Ia_3)

in said formula:

- R_1, R_2, Ar_1 and Ar_2 have the meaning given above.

82. (Previously presented) The polymer as claimed in claim 80, wherein the monomer reacted with the diphosphine corresponds to formula (X) below:

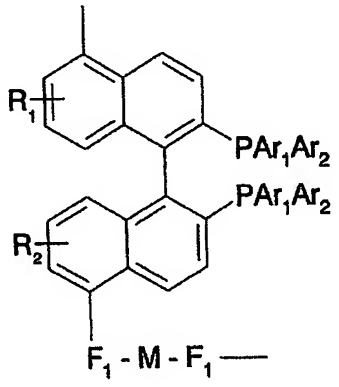
Y_1-M-Y_1 (X)

in which:

- M represents a divalent hydrocarbon-based group of aliphatic, alicyclic and/or aromatic nature, and
- Y_1 represents a functional group, optionally a carboxylic, ester, hydroxyl, amino, isocyanato, aldehyde or ketone group.

83. (Previously presented) The polymer as claimed in claim 82, wherein the monomer reacted with the diphosphine corresponds to formula (X) in which M represents a C_1-C_{12} and preferably C_1-C_6 alkylene chain; a cycloalkylene group, preferably cyclohexylene; an arylene group, preferably phenylene, tolylene or naphthalene.

84. (Previously presented) A polymer in racemic or optically active form comprising the following repeating unit:



(P)

in which

- R_1 and R_2, which are identical or different, represent a hydrogen atom or a substituent,
- Ar_1 and Ar_2 independently represent an alkyl, alkenyl, cycloalkyl, aryl or arylalkyl group,
- M represents a divalent hydrocarbon-based group of aliphatic, alicyclic and/or aromatic nature;
- F_1 represents a functional group resulting from the reaction:
  - of the group X_1 chosen from the following groups: aminomethyl, hydroxyl, hydroxymethyl, carboxylic, ester, isocyanato, isocyanatomethyl,

. and of the group Y_1 chosen from carboxylic, ester, hydroxyl, amino, isocyanato, aldehyde and ketone groups, and

- the degree of polymerization is optionally between 2 and 100.

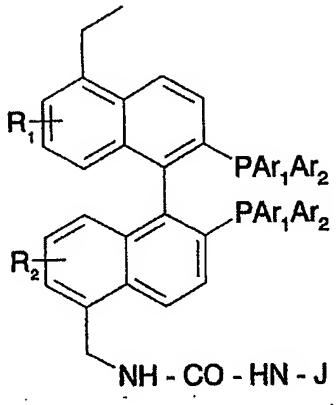
85. (Previously presented) The polymer as claimed in claim 84, wherein in formula (P), M represents a C_1-C_{12} and optionally C_1-C_6 alkylene chain; a cycloalkylene group, cyclohexylene; an arylene group, phenylene, tolylene or naphthalene.

86. (Previously presented) The polymer as claimed in claim 84, wherein in formula (P), F_1 represents:

- a urea group (F_1) resulting from the reaction of an aminomethyl group (X_1) with an isocyanato group (Y_1) or an isocyanato or isocyanatomethyl group (X_1) with an amino group (Y_1),
- a urethane group (F_1) resulting from the reaction of an isocyanato or isocyanatomethyl group (X_1) with a hydroxyl group (Y_1) or a hydroxyl or hydroxymethyl group (X_1) with an isocyanato group (Y_1),
- an ester group (F_1) resulting from the reaction of a carboxylic or ester group (X_1) with a hydroxyl group (Y_1) or a hydroxyl or hydroxymethyl group (X_1) which a carboxylic or ester group (Y_1),
- an amide group (F_1) resulting from the reaction of a carboxylic group (X_1) with an amino group (Y_1) or an aminomethyl group (X_1) with a carboxylic group (Y_1), or
- an imine group (F_1) resulting from the reaction of an aminomethyl group (X_1) with an aldehyde or ketone group (Y_1).

87. (Previously presented) The polymer as claimed in claim 80, wherein the polymer is a polyurea, polyamide, polyimide, polyimine, polyester or polyurethane.

88. (Previously presented) The polymer as claimed in claim 84, wherein it is a polymer of polyurea type containing the repeating unit:



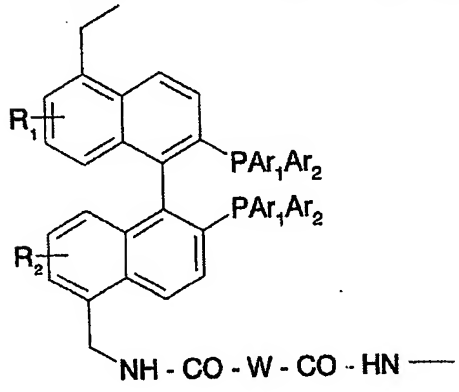
(P_1)

in which:

- R_1 and R_2, which are identical or different, represent a hydrogen atom or a substituent,
- Ar_1 and Ar_2 independently represent an alkyl, alkenyl, cycloalkyl, aryl or arylalkyl group,
- J represents a divalent hydrocarbon-based group of aliphatic, alicyclic and/or aromatic nature, and
- the degree of polymerization is optionally between 2 and 100.

89. (Previously presented) A process for preparing the polyurea as claimed in claim 88, wherein a diphosphine bearing two $-CH_2-NH_2$ groups is polymerized with one or more di- or polyisocyanates.

90. (Previously presented) The polymer as claimed in claim 80, wherein it is a polyamide containing the repeating unit:



(P_2)

in which:

- R_1 and R_2, which are identical or different, represent a hydrogen atom or a substituent,
- Ar_1 and Ar_2 independently represent an alkyl, alkenyl, cycloalkyl, aryl or arylalkyl group,
- W represents a divalent hydrocarbon-based group of aliphatic, alicyclic and/or aromatic nature,
- the degree of polymerization is optionally between 2 and 100.

91. (Previously presented) A transition metal complex comprising at least one ligand as defined in claim 65.

92. (Previously presented) A transition metal complex comprising at least one ligand as defined in claim 80.

93. (Previously presented) The complex as claimed in claim 91, wherein the transition metal is chosen from: rhodium, ruthenium, rhenium, iridium, cobalt, nickel, platinum and palladium.